



INDUSTRIAL HYGIENE PROCEDURES

EXHAUST SYSTEM SURVEY PROCEDURES

July 19, 1993

PURPOSE

The purpose of the annual ventilation survey is to assure that local exhaust systems adequately control the hazards for which they are being used. Control is deemed acceptable if air flow performance meets the requirements set forth in ES&H Manual Chapter 5091.

DISCUSSION

The air flow requirements set forth in ES&H Manual Chapter 5091 are based on ACGIH and NIOSH ventilation design and performance criteria.

EQUIPMENT

- Kurz 441 Air Velocity Meter
- Alnor 530 Micromanometer
- Tape Measure
- Calculator
- Exhaust System Survey Forms
- Exhaust System Inventory
- Exhaust System Survey Stickers
 - a. Substandard Air Flow
 - b. Maximum Duct to Work Distance
 - c. Maximum Sash Height
 - d. NOTICE: Surveyed for _____

- Indelible pen
- Environment, Safety and Health Section Scheduled Review Request Form

PROCEDURE

1. Preparation for Survey

- A. The Industrial Hygienist will provide training on the use of the equipment, ventilation requirements, and survey procedures.
- B. Print the survey forms from the FOCUS database. Ask the database manager to help print out the survey forms.
- C. Print a list of the exhaust systems.
 - Enter FOCUS
 - Type EX NEW
 - Type TABLE FILE EXHAUST
 - Type PRINT SEQ AND SDATE AND MAKE AND TYPE AND COMMENTS AND ROOM
 - Type BY LOCATION
 - Type END
 - print entire file on the laser printer.

2. General Survey Procedures

- A. When entering a building to test an exhaust unit, introduce yourself to the Building Manager. Explain the purpose of your visit.
- B. Verify the information from the previous survey. In particular, operations (spray painting, welding etc.) and associated health hazards must be determined and recorded in full. This is a critical part of the survey. If necessary, ask the Building Manager for help.

3. Specific Survey Procedures

A. GENERAL GUIDANCE

For all surveyed exhaust systems, remove the old SURVEYED FOR sticker and place it on the appropriate survey form. Replace it with a new SURVEYED FOR sticker with the date, sequence number, and your initials.

Place substandard air flow stickers on units which do not meet air flow requirements after notifying the Industrial Hygienist. Notify the Building Manager. The Industrial Hygienist will determine if the unit should be tagged out per ES&H Chapter 5091 requirements.

Enter data on the Exhaust System Survey Form. Include the calibration date for the instrument used.

B. LAB HOODS

Place the hood sash at the marked maximum sash height level. Sketch the hood opening. Divide the hood opening into 6-8 equal areas and take a reading in each area. Record readings on the sketch. Calculate the average. The average should be between 100 and 125 feet per minute. If it is not, move the sash until the correct average is obtained. At no point should a reading be below 50 fpm.

Place a MAXIMUM SASH HEIGHT sticker at the correct sash height level of the hood.

C. SPRAY BOOTHS

Sketch the booth opening. Divide the booth opening into 6-8 equal areas and take a reading in each area. Record readings on the sketch. Calculate the average. The average should be above or equal to 100 feet per minute. At no point should a reading be below 50 fpm.

D. POWER TOOLS

Do not turn power tools on unless you have permission from the Building Manager.

The range of capture velocities is 500 - 2000 fpm at the point of operation. The lower end is for low toxicity contaminants in infrequent operations. The upper end is for highly toxic materials in continuous operations. USE

THIS MEASUREMENT ONLY IF THE VENTILATION CAN BE TURNED ON WITHOUT TURNING ON THE TOOL. If this is not possible, contact the manufacturer for evaluation recommendations.

E. ABRASIVE BLAST BOOTH

The only abrasive blasting booth at Fermlab is located in IB2. Ask the Building Manager to turn the ventilation on.

The average air flow into the air inlets of the booth should be a minimum of 250 fpm. To measure the average inward velocity, open a booth door. Divide the door area into 6-9 equal areas and take a reading in each area. Record readings on a sketch. Calculate the average.

F. DOWNDRAFT TABLES

The minimum average velocity through the table face is 100 fpm. Sketch the table. Divide the table into 6-8 equal areas and take a reading in each area. Record readings on the sketch. Calculate the average. The average should at least 100 feet per minute.

G. CANOPY HOODS

Take a series of readings at the hood edge. Calculate the average. The average should be a minimum of 100 feet per minute.

H. WELD DUCTS

Find the distance from the duct for which you can obtain a minimum velocity of 100 feet per minute. Fill in and apply a MAXIMUM DUCT-TO-WORK DISTANCE sticker.

I. SLOT EXHAUST

Determine at several locations the distance from the slot needed to obtain a minimum velocity of 100 fpm. The maximum distance is 2 ft.

Fill in and apply a MAXIMUM DUCT-TO-WORK DISTANCE sticker.

J. VEHICLE EXHAUST

Record and take a series of readings at each duct and calculate the average for each duct. Obtain the dimensions of the duct to calculate the area.

Calculate the volumetric flow ($Q=VA$). The minimum flow per vehicle is 100 cfm.

K. **ABRASIVE CABINET**

Unlike most other local exhaust systems, abrasive blast cabinet exhaust systems are assessed using static pressure measurement. Static pressure measurements are taken with the Alnor Micrometer. The suction cup on this unit should be placed over a hole in the cabinet. If there is no hole in the unit, a wing nut can usually be removed (ask the Building Manager about this). The minimum allowable static pressure is 0.043 inches of water.

If the cabinet is not completely enclosed (the two holes for the gloves are open), take a measurement of the inward flow at these holes. You should get an average velocity of 500 fpm.

4. SURVEY REPORTS

- A. Enter results into the IBM data base file called EXHAUST using the EX EXHAUST command.
- B. Enter any units without operating instruction or that were tagged out into ESHTRAK.
- C. Prepare a report on the survey for Division/Section Senior Safety Officers. List the type of unit, sequence number, location, Division/Section, measured results, and required result.
- D. Complete and submit the Review Request Form. The industrial hygienist will review survey results and determine findings per ES&H Manual Chapter 5091. Findings are entered into ESHTRAK.